



PA-4R Half-Duplex Token Ring Port Adapter Installation and Configuration

Product Numbers: PA-4R and PA-4R=

This configuration note describes the installation and configuration of the half-duplex PA-4R(=) Token Ring port adapter, which can be used in the following supported platforms:

- Cisco 7200 series routers,, which consists of the 2-slot Cisco 7202, 4-slot Cisco 7204, and the 6-slot Cisco 7206
- Second-generation Versatile Interface Processor (VIP2) in all Cisco 7500 series routers and Cisco 7000 series routers. (Refer to the section “[Software and Hardware Requirements](#)” on page 2.)



Note

For VIP2 users, use this configuration note in conjunction with the configuration note *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration* (Document Number 78-2658-xx), which shipped with your VIP2.

For Cisco 7200 series router users, use this configuration note in conjunction with the *Cisco 72xx Installation and Configuration Guide* that shipped with your Cisco 7200 series router.

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Port Adapter Installation Prerequisites

This section provides software requirements, a list of parts and tools you will need to perform the port adapter installation, and safety and ESD-prevention guidelines to help you avoid injury and damage to the equipment during installation. Also included is information on the systems in which port adapters can be installed and overview information on interface specifications.

The following sections discuss general information and information about port adapter installation requirements:

- [Software and Hardware Requirements, page 2](#)
- [Checking Hardware and Software Compatibility, page 3](#)
- [List of Parts and Tools, page 3](#)
- [Safety Guidelines, page 3](#)
- [Token Ring Overview, page 6](#)

Software and Hardware Requirements

The 4R port adapter on a VIP2-15 or VIP2-40 installed in a Cisco 7000 series or Cisco 7500 series router requires that the host router is running Cisco IOS Release 11.1(472) or later, Cisco IOS Release 11.1(9)CA or later, Cisco IOS Release 11.2(1) or later, or Cisco IOS Release 11.2(6)P or later.

The 4R port adapter installed in a Cisco 7204 or Cisco 7206 requires that the host router is running Cisco IOS Release 11.1(472) or later, Cisco IOS Release 11.1(9)CA or later, Cisco IOS Release 11.2(1) or later, or Cisco IOS Release 11.2(6)P or later.

The 4R port adapter installed in a Cisco 7202, requires that the host router is running Cisco IOS Release 11.1(19)CC1 or later, or Cisco IOS Release 11.3(4)AA or later.

In the Cisco 7000 series or Cisco 7500 series routers, the 4R port adapter requires the following VIP2 models:

- VIP2-15 (1 MB of SRAM, 8 MB of DRAM)
- VIP2-20 (1 MB of DRAM, 16 MB of SRAM)
- VIP2-40 (2 MB of SRAM, 32 MB of DRAM)

**Caution**

To prevent system problems, the VIP2 requires that the Cisco 7000 series router has the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI) installed. The VIP2 will *not* operate properly with the Route Processor (RP), Switch Processor (SP), or Silicon Switch Processor (SSP) installed in the Cisco 7000 series router.

**Note**

The minimum recommended VIP2 model is a VIP2-15.

Checking Hardware and Software Compatibility

To check the minimum software requirements of Cisco IOS software with the hardware installed on your router, Cisco maintains the Software Advisor tool on Cisco.com. This tool does not verify whether modules within a system are compatible, but it does provide the minimum IOS requirements for individual hardware modules or components.

**Note**

Access to this tool is limited to users with Cisco.com login accounts.

To access Software Advisor, click **Login** at Cisco.com and go to **Technical Support Help—Cisco TAC: Tool Index: Software Advisor**. You can also access the tool by pointing your browser directly to <http://www.cisco.com/cgi-bin/support/CompNav/Index.pl>.

Choose a product family or enter a specific product number to search for the minimum supported software release needed for your hardware.

List of Parts and Tools

You need the following tools and parts to install a port adapter. If you need additional equipment, contact a service representative for ordering information.

- PA-4R(=) port adapter and one of the following:
 - VIP2-15(=), VIP2-20=, VIP2-40(=)
 - Cisco 7200 series router with at least one available port adapter slot
- The appropriate Cisco IOS software (For specific Cisco IOS software prerequisites, refer to the section “[Software and Hardware Requirements](#)” on page 2.)
- Cables appropriate for the port adapter’s interfaces (Token Ring cables are not available from Cisco Systems; they are available from outside commercial cable vendors.)
- Number 1 Phillips and a 3/16-inch, flat-blade screwdriver.
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all upgrade kits, FRUs, and spares.

Safety Guidelines

Following are safety guidelines that you should follow when working with any equipment that connects to electrical power or telephone wiring.

Safety Warnings



Warning

This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Waarschuwing

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

Varoitus

Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).

Attention

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.

Warnung

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewusst. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.

Avvertenza

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.

Advarsel

Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskaade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.

Aviso	Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento <i>Regulatory Compliance and Safety Information</i> (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.
¡Advertencia!	Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado <i>Regulatory Compliance and Safety Information</i> (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.
Varning!	Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förkommer i denna publikation i dokumentet <i>Regulatory Compliance and Safety Information</i> (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before moving a chassis.
- Do not work alone when potentially hazardous conditions exist and never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe. Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

Telephone Wiring Guidelines

Use the following guidelines when working with any equipment that is connected to telephone wiring or to other network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Port adapters and processor modules consist of printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.



Caution

For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohms.

Token Ring Overview

The following sections describe Token Ring specifications, physical connections, connection equipment, and cables and connectors.

Token Ring Specifications

The term *Token Ring* refers to both IBM's Token Ring Network, which IBM developed in the 1970s, and to IEEE 802.5 networks. The IEEE 802.5 specification was modeled after, and still closely shadows, IBM's network. The two types are compatible, although the specifications differ slightly.

Token Ring and IEEE 802.5 are token passing networks, which move a small frame, called a token, around the network. Possession of the token grants the right to transmit; a station with information to transmit must wait until it detects a free token passing by.

The IBM Token Ring specifies a star topology, with all end stations connected through a device called a multistation access unit (MSAU). IEEE 802.5 does not specify any topology, although most implementations are based on a star configuration with end stations attached to a device called a media

access unit (MAU). Also, IBM Token Ring specifies twisted-pair cabling, whereas IEEE 802.5 does not specify media type. Most Token Ring networks use shielded twisted-pair cabling; however, some networks that operate at 4 Mbps use unshielded twisted-pair cable.

Table 1 shows a comparison of the two types.

Table 1 IBM Token Ring and IEEE 802.5 Comparison

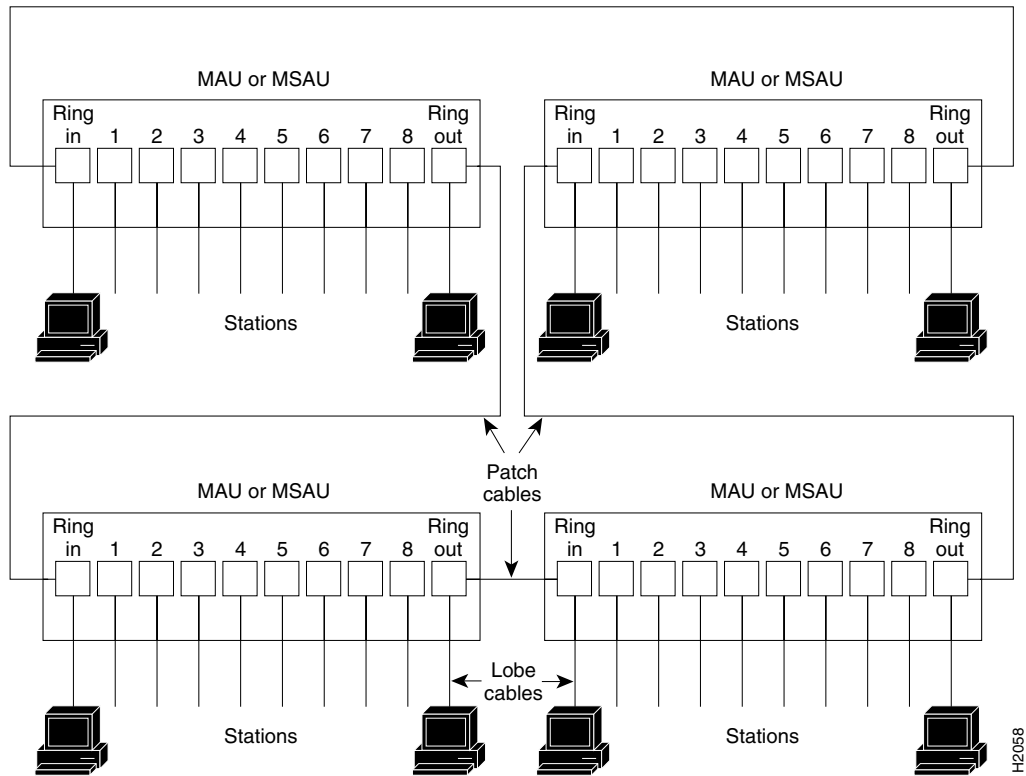
Network Type	Data Rates	Stations/ Segment	Topology	Media	Signaling	Access Method	Encoding
IBM Token Ring network	4, 16 Mbps	260 shielded twisted-pair 72 unshielded twisted-pair	Star	Twisted-pair	Baseband	Token passing	Differential Manchester
IEEE 802.5 network	4, 16 Mbps	250	Not specified	Not specified	Baseband	Token passing	Differential Manchester

All 4R port adapter interfaces support both 4- and 16-Mbps, half-duplex operation and early token release. The default for all ports is for 4-Mbps operation and early token release disabled. Both states are enabled with configuration commands in configuration mode.

To enable 16 Mbps, specify the slot/port address and use the configuration command **ring-speed 16**; to return to 4 Mbps operation, use the command **ring-speed 4**. To enable and disable early token release, specify the slot/port address and use the configuration command **[no] early token release**. For complete descriptions and examples of software commands, refer to the related software configuration documentation.

In the typical Token Ring network shown in Figure 1, lobe cables connect each Token Ring station (4R port adapter interface) to the MSAU (or MAU), and patch cables connect adjacent MSAUs (or MAUs) to form one large ring.

Figure 1 Token Ring Network Physical Connections



Token Ring Connection Equipment

You will need an 802.5 MAU or an MSAU to provide the interface between the 4R port adapter Token Ring interfaces and the external ring, and a Token Ring lobe cable between each 4R port adapter interface and the MAU or MSAU. Lobe cables connect each Token Ring station (4R port adapter interface) to the MAU or MSAU, and patch cables can connect adjacent MSAUs to form one large ring.

4R port adapter interfaces operate at either 4 or 16 Mbps. The default speed for all 4R port adapter interfaces is 4 Mbps, which you can change to 16 Mbps on any port using the **ring-speed n** configuration command, where *n* is the speed (4 or 16) in Mbps. The speed of each Token Ring port must match the speed of the ring to which it is connected. Before you enable the Token Ring interfaces, ensure that each is set for the correct speed, or it can bring down the ring.



Caution

Each 4R port adapter interface must be configured for the same ring speed as the ring to which it is connected, either 4 or 16 Mbps. If the port is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

Token Ring Distance Limitations

The maximum transmission distance is not defined for IEEE 802.5 (Token Ring) networks. Shielded twisted-pair (STP) cabling is most commonly used for rates of 4 and 16 Mbps. Twisted-pair cabling is more susceptible to interference than other types of cabling; therefore, the network length and repeater spacing should be planned accordingly.

Token Ring Speed Considerations

Before you install the 4R port adapter, determine the ring speed (4 or 16 Mbps) of each ring to be connected to the server. There is no factory default for the interface speed; you must set the speed of each interface (within the **setup** command facility or with the **ring-speed** command) before you bring the interface up and insert it into the ring with the **no shutdown** command.



Caution

Each Token Ring port must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the port is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

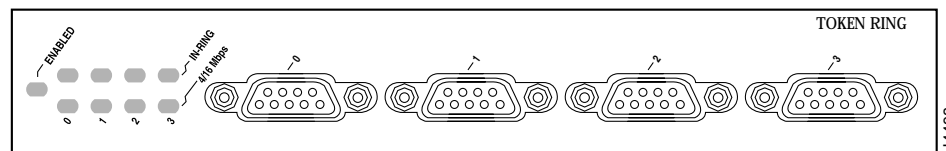
What Is the 4R Port Adapter?

The following sections provide additional information specific to the 4R port adapter:

- [Port Adapter Locations on the VIP2 and the Cisco 7200 Series Router, page 9](#)
- [4R Port Adapter LEDs, page 11](#)
- [4R Port Adapter Receptacles, Cables, and Pinouts, page 12](#)

The 4R port adapter (see) provides up to four IBM Token Ring or IEEE 802.5 Token Ring interfaces. Each Token Ring interface can be set for 4 Mbps or 16 Mbps. All Token Ring ports on PA-4R are half duplex (only) and run at wire speed.

Figure 2 4R Port Adapter (Faceplate View)



The 4R port adapter can be installed on the VIP2 in port adapter slot 0 and port adapter slot 1, or in the Cisco 7200 series routers in any of the chassis' port adapter slots: slot 1 and slot 2 of the Cisco 7202, slots 1 through 4 of the Cisco 7204, and slots 1 through 6 of the Cisco 7206.

Port Adapter Locations on the VIP2 and the Cisco 7200 Series Router

This section provides information about where you can install the 4R port adapter on the VIP2 and in the Cisco 7200 series routers.

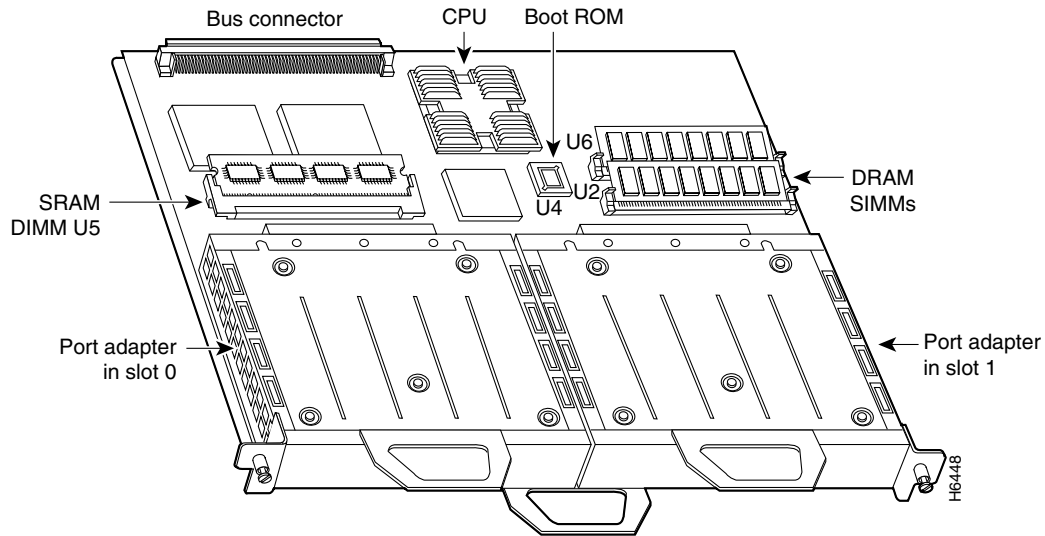


Note

Port adapters have handles that allow for easy installation and removal; however, they are occasionally not shown in this publication to highlight port adapter faceplate detail.

shows a VIP2-15 or VIP2-40 with two installed port adapters. With the VIP2 oriented as shown, the left port adapter is in port adapter slot 0, and the right port adapter is in port adapter slot 1.

Figure 3 Two Port Adapters on the VIP2-15 or VIP2-40 (Horizontal Orientation Shown)



Note

In the Cisco 7000, Cisco 7507, and Cisco 7513 chassis, the VIP2 is installed vertically. In the Cisco 7010 and Cisco 7505 chassis, the VIP2 is installed horizontally.

In the Cisco 7200 series routers, port adapter slots are numbered from the lower left to the upper right, beginning with port adapter slot 1 and continuing through port adapter slot 2 for the Cisco 7202, slot 4 for the Cisco 7204, and slot 6 for the Cisco 7206. Port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller.

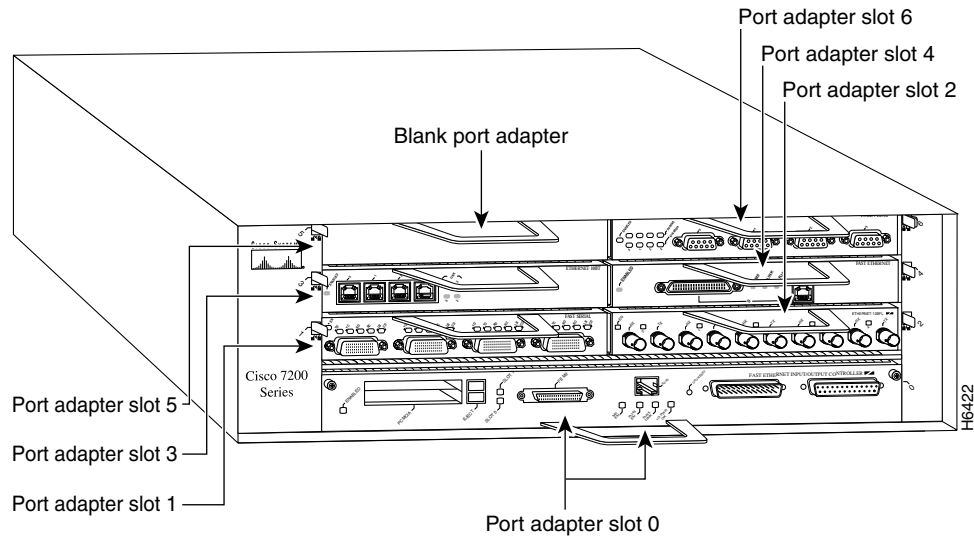


Note

The I/O controller is available with or without a Fast Ethernet port. You can install both I/O controller types in all Cisco 7200 series routers; however, when you install an I/O controller with a Fast Ethernet port in a Cisco 7202, the system software automatically disables the port.

Figure 4 shows a Cisco 7206 with installed port adapters and an I/O controller with a Fast Ethernet port. Not shown are the Cisco 7202, which has two port adapter slots, and the Cisco 7204, which has four port adapter slots. The 4R-FDX port adapter can be installed in any available port adapter slot in the Cisco 7200 series routers.

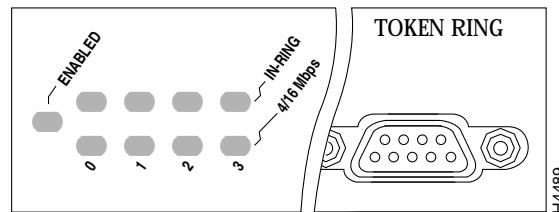
Figure 4 Port Adapters in the Cisco 7206



4R Port Adapter LEDs

The 4R port adapter has several LEDs that indicate status of the port adapter and its interfaces. After system initialization, the enabled LED goes on to indicate that the 4R port adapter has been enabled for operation. (The LEDs are shown in .)

Figure 5 4R Port Adapter LEDs (Partial Faceplate View)



The following conditions must be met before the enabled LED goes on:

- The port adapter is enabled for operation and correctly connected
- The port adapter is receiving power
- The system contains a valid microcode version for the port adapter

If any of these conditions is not met, or if the initialization fails for other reasons, the port adapter's enabled LED does not go on.

When a Token Ring interface is configured by using software commands, the In Ring and 4/16 Mbps LEDs (shown in) indicate the following for each port:

- In ring—Goes on when the interface is currently active and inserted into the ring; off when the interface is not active and is not inserted into a ring.
- 4/16 Mbps—Goes on if the interface is operating at 16 Mbps; off when the interface is operation at 4 Mbps (default).

4R Port Adapter Receptacles, Cables, and Pinouts

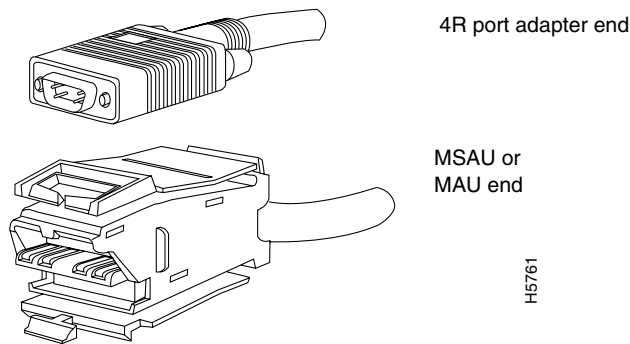
A network interface cable provides the connection between the 9-pin Token Ring receptacles on the 4R port adapter and a media access unit (MAU). The 9-pin connector at the 4R port adapter end and the MAU connector at the network end are described in the section “[Token Ring Connection Equipment](#)” on page 8.

4R Port Adapter Cables

The Token Ring ports on the 4R port adapter are DB-9 (PC type) receptacles that require Type 1 or Type 3 lobe cables. Token Ring interface cables are not available from Cisco Systems, but are commercially available through outside cable vendors.

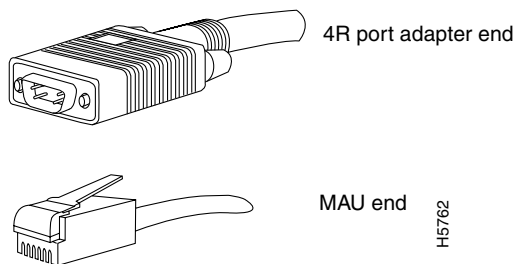
Type 1 lobe cables use shielded twisted-pair (STP) cable and terminate at the network end with a large MAU plug. (See [Figure 6](#).) The 4R port adapter end of the cable is a DB-9 plug.

Figure 6 Token Ring Type 1 Lobe Cable Connectors (DB-9 and MAU Types)



Type 3 lobe cables use either shielded or unshielded twisted-pair (UTP) cable and terminate at the network end with an RJ-11 plug. (See .) The 4R port adapter end of the cable is a DB-9 plug.

Figure 7 Token Ring Type 3 Lobe Cable Connectors (DB-9 and RJ-11 Types)



4R Port Adapter Receptacle Pinout

Table 2 lists the pinout for the DB-9 receptacle used on the 4R port adapter.

Pin	Signal
1	Ring-In B
5	Ring-Out A
6	Ring-In A
9	Ring-Out B
10 and 11	Ground

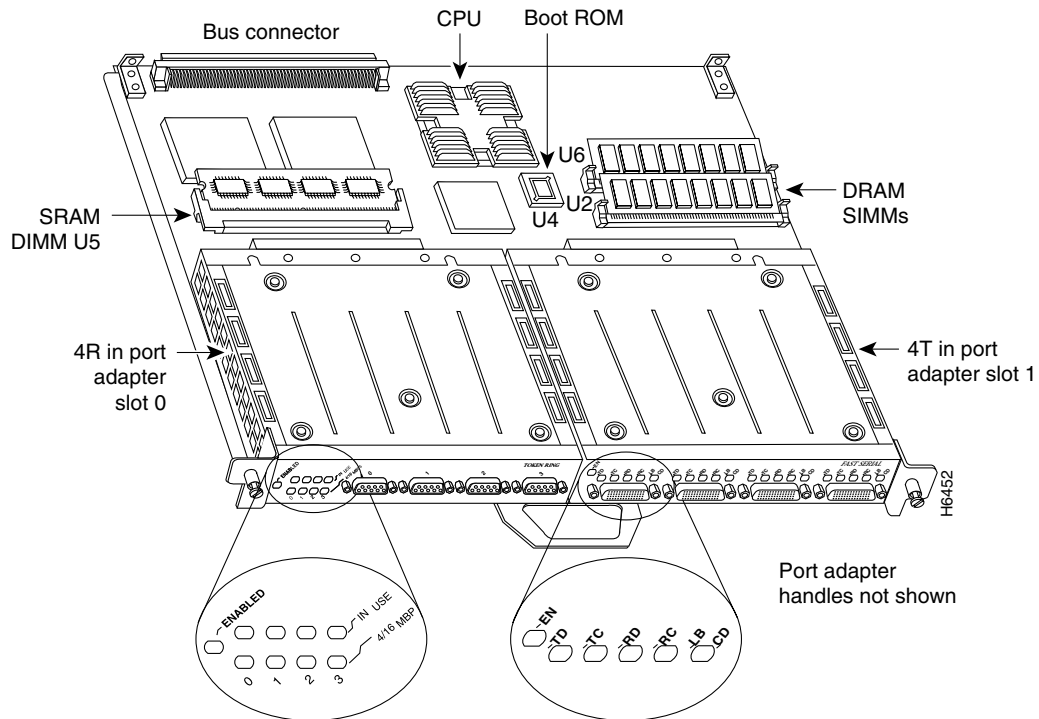
VIP2 and the 4R Port Adapter

This section describes the 4R port adapter and its use with the VIP2 and provides the following additional information specific to the 4R port adapter and its use on the VIP2 in Cisco 7000 series and Cisco 7500 series routers:

- [Installing or Replacing a Port Adapter on a VIP2, page 14](#)
- [Attaching 4R Port Adapter Interface Cables, page 18](#)
- [Configuring the 4R Interfaces, page 19](#)
- [Checking the Configuration, page 24](#)

The 4R port adapter can be installed in either port adapter slot 0 or port adapter slot 1 on the VIP2. shows a 4R port adapter installed in port adapter slot 0, on a VIP2-15 or VIP2-40.

Figure 8 VIP2-15 or VIP2-40 with a 4R Port Adapter in Port Adapter Slot 0



Port adapters have a handle attached, but this handle is not shown to allow a full view of detail on each port adapter's faceplate.

Installing or Replacing a Port Adapter on a VIP2

Depending on the circumstances, you might need to install a new port adapter on a VIP2 motherboard or replace a failed port adapter in the field. In either case, you need a number 1 Phillips screwdriver, an antistatic mat onto which you can place the removed interface processor, and an antistatic container into which you can place a failed port adapter for shipment back to the factory.

Caution

To prevent system problems, do not remove port adapters from the VIP2 motherboard, or attempt to install other port adapters on the VIP2 motherboard, *while the system is operating*. To install or replace port adapters, first remove the VIP2 from its interface processor slot.

Note

Each port adapter circuit board is mounted to a metal carrier and is sensitive to ESD damage. Each port adapter has one Phillips-head screw that secures it to its port adapter slot. We strongly recommend that the following procedures be performed by a Cisco-certified service provider; however, this is not a requirement.

While the VIP2 supports online insertion and removal, individual port adapters do not. To replace port adapters, you must first remove the VIP2 from the chassis, then install or replace port adapters as required. If a blank port adapter is installed on the VIP2 in which you want to install a new port adapter, you must first remove the VIP2 from the chassis, then remove the blank port adapter.

**Caution**

To prevent interface reconfiguration requirements, you *should* replace a port adapter with the same type of port adapter you removed, but this is not a requirement.

When only one port adapter is installed on a VIP2, a blank port adapter must fill the empty slot to allow the VIP2 and router chassis to conform to electromagnetic interference (EMI) emissions requirements, and so that air flows through the chassis properly. If you plan to install a new port adapter, you must first remove the blank port adapter.

Use the following standard procedure to remove and replace any type of port adapter on a VIP2:

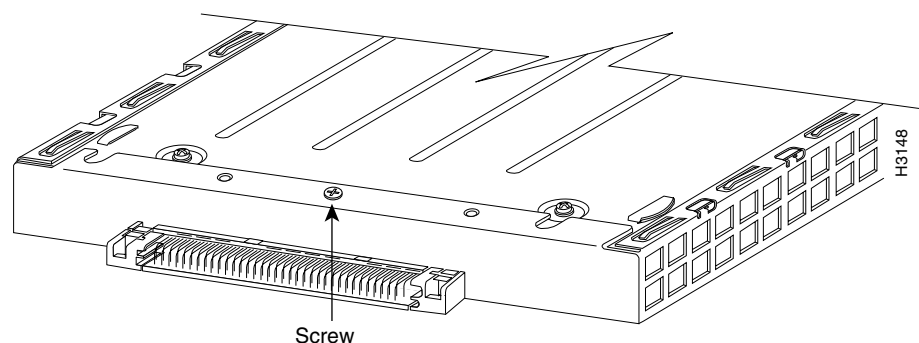
- Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

**Note**

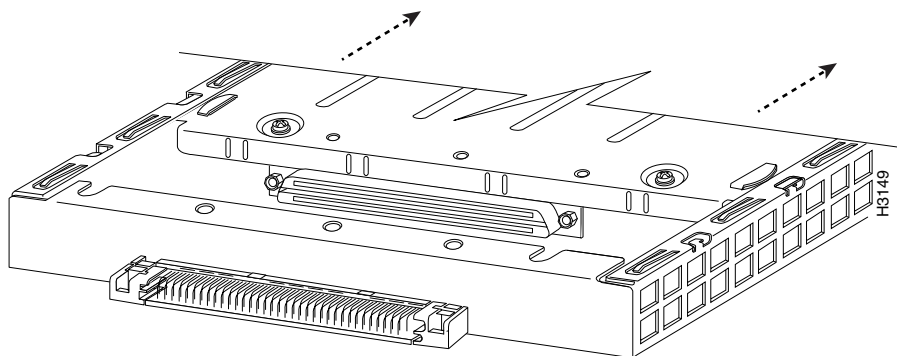
If you want to install a new port adapter on a VIP2 with a single port adapter, you must first remove the blank port adapter from the port adapter slot in which you want to install the new port adapter.

- Step 2** For a new port adapter installation or a port adapter replacement, disconnect any interface cables from the ports on the front of the port adapter, although, this is not required. You can remove VIP2s with cables attached; however, we do not recommend it.
- Step 3** Remove the VIP2 from the system. (Follow the steps in the section “Removing a VIP2” in the configuration note *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration* [Document Number 78-2658-xx], which shipped with your VIP2.) Place the removed VIP2 on an antistatic mat.
- Step 4** Locate the screw at the rear of the port adapter (or blank port adapter) to be replaced. (See .) This screw secures the port adapter (or blank port adapter) to its slot.

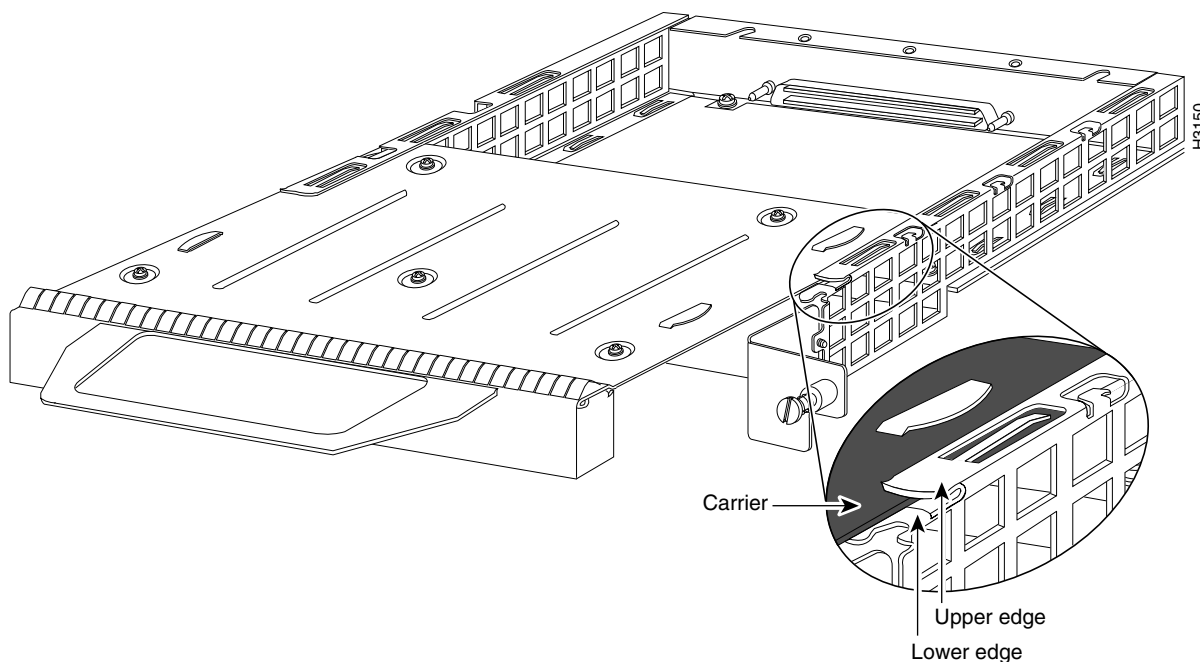
Figure 9 Location of Port Adapter Screw (Partial Port Adapter View)



- Step 5** Remove the screw that secures the port adapter (or blank port adapter).
- Step 6** With the screw removed, grasp the handle on the front of the port adapter (or blank port adapter) and carefully pull it out of its slot, away from the edge connector at the rear of the slot. (See .)

Figure 10 Pulling a Port Adapter Out of a Slot (Partial Port Adapter View)

- Step 7** If you removed a port adapter, place it in an antistatic container for safe storage or shipment back to the factory. If you removed a blank port adapter, no special handling is required; however, store the blank port adapter for potential future use.
- Step 8** Remove the new port adapter from its antistatic container and position it at the opening of the slot. (See [Figure 11](#).)
- Step 9** Carefully align the port adapter carrier between the upper and lower edges of the port adapter slot, as shown in [Figure 11](#).

Figure 11 Aligning a Port Adapter in a Port Adapter Slot**Caution**

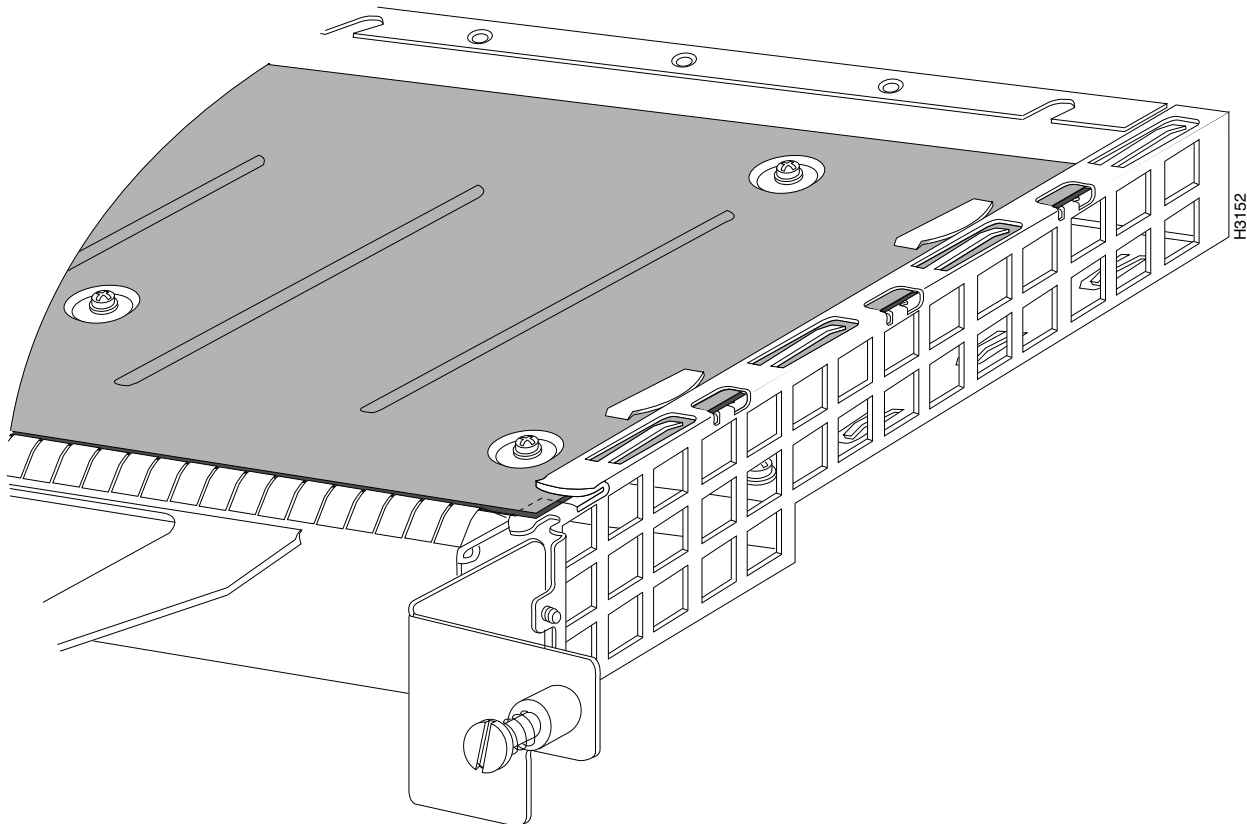
To prevent jamming the carrier between the upper and lower edges of the port adapter slot and to ensure that the edge connector at the rear of the port adapter seats in the connector at the rear of the port adapter slot, make certain that the leading edges of the carrier are between the upper and lower slot edges, as shown in the cutaway in [Figure 11](#).

**Caution**

To ensure a positive ground attachment between the port adapter carrier and the VIP2 motherboard and port adapter slot, and to ensure that the connectors at the rear of the port adapter and slot seat properly, position the carrier between the upper and lower slot edges, as shown in [Figure 12](#).

- Step 10** Carefully slide the new port adapter into the port adapter slot ([Figure 12](#)) until the connector on the port adapter is completely seated in the connector on the motherboard.

Figure 12 Port Adapter Installed in a Port Adapter Slot (Partial Port Adapter View)



- Step 11** Replace the screw in the rear of the port adapter slot. (See [Figure 12](#) for its location.) Do not overtighten this screw.
- Step 12** Reinstall the VIP2 in the system. (Follow the steps in the section “Installing a VIP2” in the configuration note *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration* [Document Number 78-2658-xx], which shipped with your VIP2.)
- Step 13** If disconnected, reconnect the interface cables to the port adapters.

This completes the procedure for installing a new port adapter or replacing a port adapter on a VIP2.

Attaching 4R Port Adapter Interface Cables

The Token Ring ports on the 4R port adapter run at either 4- or 16 Mbps. You need one Token Ring interface cable for each 4R port adapter interface you want to use. Token Ring interface cables are not available from Cisco Systems, but are commercially available through outside cable vendors. Port adapters have a handle attached (see), but this handle is not shown in to allow a full view of detail on the 4R port adapter's faceplate.

Use the following procedure to attach Token Ring cables to the 4R port adapter:

Step 1 Determine which 4R port adapter ports you want to use.

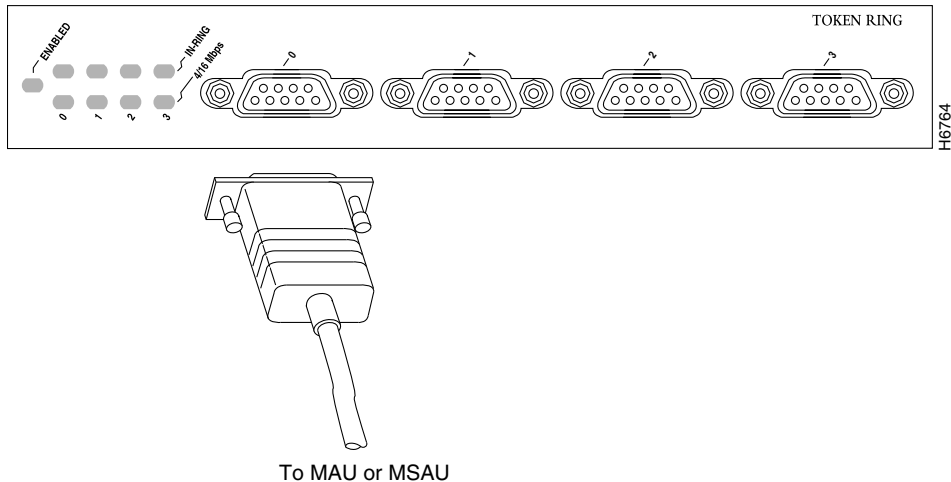


Note

The IBM Token Ring specifies a star topology, with all end stations connected through a device called an MSAU. IEEE 802.5 does not specify any topology, although most implementations are based on a star configuration with end stations attached to a device called an MAU. Also, IBM Token Ring specifies twisted-pair cabling, whereas IEEE 802.5 does not specify media type. Most Token Ring networks use shielded twisted-pair (STP) cabling; however, some networks that operate at 4 Mbps use UTP cable.

Step 2 Attach the port adapter end of a Token Ring interface cable, or other connection equipment, to the interface port. (See [Figure 13](#)).

Figure 13 Token Ring Interface Cable Connections



Caution

Each 4R port adapter interface must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the 4R port adapter interface is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

Step 3 Attach the network end of the Token Ring interface cable to the appropriate Token Ring equipment at your site: a MAU or MSAU.

This completes the procedure for attaching interface cables to the 4R port adapter.

Configuring the 4R Interfaces

The following procedures describe basic configuration information for the 4R port adapter. If you installed a new 4R port adapter or if you want to change the configuration of an existing interface, you must enter configuration mode using the **configure** command. If you replaced a 4R port adapter that was previously configured, the system will recognize the new 4R interfaces and bring them up in their existing configuration.

After you verify that the new 4R port adapter is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Be prepared with the information you will need, such as the following:

- Protocols you plan to route on each new interface
- Internet protocol (IP) addresses if you plan to configure the interfaces for IP routing
- Whether the new interfaces will use bridging



Note

The 4R interfaces on a VIP2 can be configured for 16-Mbps operation and are configured for 4-Mbps operation as a default.

For a summary of the configuration options available and instructions for configuring the 4R interfaces on the VIP2, refer to the appropriate configuration publications listed in the section “If You Need More Information” on page 2.

Determining Chassis Slot, Port Adapter, and Token Ring Interface Port Numbers

The following section describes how to identify chassis slot, port adapter, and Token Ring interface port numbers.



Note

Although the processor slots in the seven-slot Cisco 7507 and 13-slot Cisco 7513 are vertically oriented and those in the five-slot Cisco 7505 are horizontally oriented, all models use the same method for slot and port numbering.

In the router, physical port addresses specify the actual physical location of each interface port on the router interface processor end. (See .) This address is composed of a three-part number in the format *chassis slot number/port adapter number/interface port number*, as follows:

- The first number identifies the chassis slot in which the VIP2 is installed (as shown in the example system in).
- The second number identifies the physical port adapter number on the VIP2, and is either 0 or 1.
- The third number identifies interface ports on each 4R port adapter and are always numbered in sequence as interface 0 through 3.

Interface ports on the 4R port adapter maintain the same address regardless of whether other interface processors are installed or removed. However, when you move a VIP2 to a different slot, the first number in the address changes to reflect the new slot number.

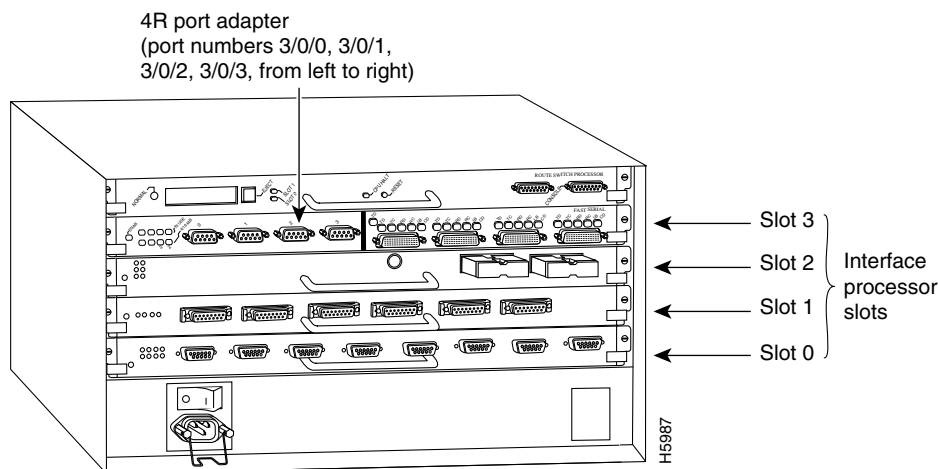
shows some of the slot port adapter and interface ports of a sample Cisco 7505 system. The first port adapter slot number is always 0. The second port adapter slot number is always 1. The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter.

For example, the addresses for the 4R interface ports on the first port adapter on a VIP2 (see) are 3/0/0 through 3/0/3 (chassis slot 3, port adapter slot 0, and interface ports 0 through 3). If the 4R port adapter were installed in port adapter slot 1, the interface addresses would be 3/1/0 through 3/1/3.


Note

If you remove the 4R-equipped VIP2 (shown in) from chassis slot 3 and install it in slot 2, the addresses of those same ports become 2/0/0 through 2/0/3.

Figure 14 4R Token Ring Interface Port Number Example (Cisco 7505 Shown)



You can identify interface ports by physically checking the slot/port adapter/interface port location on the back of the router or by using software commands to display information about a specific interface or all interfaces in the router.

Using the EXEC Command Interpreter

You can modify the startup configuration for Cisco 7500 series routers through the software command interpreter called *EXEC*. To configure the interfaces for interface processors, you can use either one of the **setup** or **configure** EXEC commands.

The **setup** command facility can be used after first time startup to make basic changes at any time. The changes you make will affect only the changed elements' current memory values that are stored in nonvolatile memory.

The **configure** privileged EXEC command enables you to perform advanced configurations such as specifying interfaces. The EXEC interprets the commands you enter and carries out the corresponding operations. You can list available EXEC commands by entering a question mark (?). You also can enter a question mark to obtain more information about commands. For example, enter **terminal ?** to obtain a list of **terminal** commands or **show ?** to obtain a list of **show** commands.

Before you use the **setup** or the **configure** command, you must have privileged access to the EXEC command interpreter. The system prompt for the privileged level ends with a pound sign (#) instead of an angle bracket (>). The EXEC **enable** command allows access to the privileged level, prompting for a password if one has been set with the **enable-password** configuration command.

Follow these steps to enter the privileged level of the EXEC.

Step 1 At the EXEC prompt for a router, enter the **enable** command:

```
Router> enable
```

```
The EXEC prompts you for a privileged level password:
Password:
```

Step 2 Enter the password.

For security purposes, the password is not displayed. (Also note that the password is case sensitive). When you enter the correct password, the system displays the privileged mode system prompt:

```
Router#
```

To configure Token Ring interfaces using the **setup** EXEC command facility, follow the instructions in the section “[Using the Setup Command Facility](#).” To configure the Token Ring interfaces by using the **configure** EXEC command, follow the instructions in the section “[Determining Chassis Slot, Port Adapter, and Token Ring Interface Port Numbers](#)” on page 19.

Using the Setup Command Facility

The **setup** command facility identifies all interfaces (including the Token Ring interfaces for the ports on the 4R port adapter) that are installed and prompts you for configuration information for each installed interface. When you finish configuring one interface, the **setup** command facility prompts you for the next, continuing until each interface has been configured.

When you enter the **setup** command facility after first time startup, you must run through the entire dialog until you come to the interface you want to change. Note that when you use the **setup** command after first time startup, the default values indicated within the brackets in the System Configuration Dialog are the values last set using the **setup** command facility or left as defaults.

After you choose to continue with the **setup** command (by answering **yes** to the system configuration dialog prompt), the remainder of the script is the actual configuration process. The dialog prompts you first for global system parameters, then for configuration information for each interface. The existing configuration is displayed as the default, in brackets ([]), at the end of each prompt. Press Return to accept the default settings.



Note

After you start the **setup** command facility, the system runs through the entire configuration process; you cannot quit out of it. To make a change or correct a mistake, press the Return key at each prompt, answer **no** when asked if you want to save the configuration, and restart the setup facility.

Use the **setup** command facility to configure the 4R Token Ring interfaces, as follows:

Step 1 After you access the privileged level of the EXEC, as described in the section “[Using the EXEC Command Interpreter](#)” on page 20, enter the **setup** command to begin the setup facility:

```
Router# setup
```

Step 2 The following script is displayed on the screen, with the name of your router as the default in the brackets.

```
-System Configuration Dialog-
At any point you may enter a question mark '?' for help.
Refer to the 'Getting Started' Guide for additional help.
Default settings are in square brackets '['].
Continue with configuration dialog? [yes]:
```

```
(Use Ctrl-c to abort configuration at any prompt)
Configuring global parameters:
Enter host name [Router]: sandbox
```

Step 3 To accept the default and keep the router name, press **Return**. (If you do want to change the name of the router, enter the new name before pressing **Return**.)

Step 4 Proceed through the remainder of the global parameter prompts, using the Return key to accept the defaults.

After the global parameters are configured, the system prompts you for interface configuration information, one interface at a time. Following is a partial display of the script for a previously configured interface:

```
Configuring interface parameters:

Configuring interface Token Ring0:
  Is this interface in use [yes]:
Tokenring ring speed (4 or 16) [16]
  Configure IP on this interface? [yes]:
  IP address for this interface: 1.1.1.30
  (remainder of display text omitted)
```



Caution Each 4R port adapter interface must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the 4R port adapter interface is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

Step 5 To accept the default at each prompt and retain the existing configuration information, press the **Return** key. When you reach the scripts for configuring new interfaces, enter the new configuration information at each prompt.

When all interfaces are configured, the system displays the entire configuration script followed by a prompt for which there is no default (you must enter **yes** or **no**):

```
Use this configuration [yes/no]:
```

Step 6 To use the configuration you created, enter **yes**. To discard the configuration file and begin the configuration process again, enter **no**.

If you entered **yes** at the prompt, the following message is displayed:

```
Press RETURN to get started!
```

The configuration process is complete. Proceed to the section “Checking the Configuration” on page 24. It provides **show** commands you can use to display and verify the configuration information.

Configuring Interfaces Using the `configure` Command

Following are instructions for a basic configuration using the **configure** command: enabling an interface, setting interface ring speed, and specifying IP routing. You might also need to enter other configuration subcommands depending upon the requirements for your system configuration. Press the **Return** key after each step unless otherwise noted. At any time you can exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable
```

Router>

Use the following procedure to perform a basic configuration:

- Step 1** After you access the privileged level of the EXEC as described in the section “Using the EXEC Command Interpreter” on page 20, enter the **configure** command:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

- Step 2** Specify the first Token Ring interface to configure by entering the subcommand **interface** *type slot/port adapter/interface*. For example, if you are configuring Token Ring interface 0 for a 4R port adapter installed in port adapter slot 0, on a VIP2 installed in chassis slot 3, enter the following command:

```
Router(config)# interface tokenring 3/0/0
```

- Step 3** If IP routing is enabled on the system, you can assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand as follows:

```
Router(config-if)# ip address ip address subnet mask
```



Caution Each Token Ring port must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the port is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.



Note Token Ring ports operate at either 4 or 16 Mbps. The default speed for the 4R port adapter's Token Ring ports is 4 Mbps, which you can change to 16 Mbps on any port using the configuration **ring-speed** *n* command, where *n* is the speed (4 or 16) in Mbps. Before you enable the Token Ring interfaces, ensure that each is set for the correct speed, or it can bring down the ring.

- Step 4** Change the default shutdown state and enable the interface:

```
Router(config-if)# no shutdown
```

When you enable the interface by using the **no shutdown** command, the LED for 4 Mbps or 16 Mbps is turned on after about 5 seconds. The In Ring LED for that interface is turned on about 5 to 18 seconds later, when the port is initialized and connected to the ring.

- Step 5** Either accept the default ring speed of 4 Mbps, or enable the Token Ring interface speed for 16-Mbps operations as follows:

```
Router(config-if)# ring-speed 16
```

- Step 6** Enter any additional configuration subcommands required.

- Step 7** Repeat Steps 2 through 6 for each new interface.

- Step 8** When all new interfaces are configured, press **Ctrl-Z** (hold the Control key down and press the **Z** key).

- Step 9** Write the new configuration to nonvolatile memory by entering the following:

```
Router# copy running-config startup-config
[OK]
Router#
```

- Step 10** Enter **quit** to exit configuration mode:

```
Router# quit
```

You have now completed configuring the Token Ring interfaces. Check the configuration as described in the section “Checking the Configuration.”

Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces and the **ping** command to check connectivity. Refer to the publications listed in the section “If You Need More Information” on page 2, for detailed command descriptions and examples.

Using show Commands to Verify the VIP2 Status

After configuring the new interface(s) using either the **setup** command or the **configure** command, use the EXEC **show commands** to display status information.

Step 1 Display the system software and hardware configuration with the **show version** command. Ensure that the list includes the new interfaces and that your system is running the appropriate Cisco IOS software for your configuration.

Step 2 Enter the **show configuration** command to display the current system configuration file:

```
Router# show configuration
```

The configuration file for the router is displayed. Check the Token Ring configuration information in the display.

Step 3 Enter the **show interfaces** command to display and check all interfaces:

```
Router# show interfaces
```

Each interface is listed along with its assigned IP address. Verify that each new Token Ring interface appears.

Step 4 Enter the **show interface tokenring slot/port adapter/port** command to obtain detailed status information about a specific Token Ring interface:

```
Router# show interface tokenring slot/port adapter/port
```

Detailed information about the interface is displayed. The first line of display specifies the interface along with its slot and port number. It indicates whether the hardware is functional and if the line protocol is up or down. If the line protocol is down (and you did not administratively shut it down), or if the hardware is not functioning properly, ensure that the network interface is properly connected and terminated. (For explanations of the displayed information, refer to publications listed in the section “If You Need More Information,” on page 2, which are available on the Documentation CD-ROM.)

Step 5 Enter the **show controller** command to display the current status of VIP2s with 4R port adapters installed:

```
Router# show controllers token
```

The display lists the Token Ring interfaces connected to each VIP2 and indicates whether the system has identified your new interface. It does not indicate the state of the line or the protocol.

To display information about a specific interface, use the **show interfaces** command with the interface type and port address in the format **show interfaces [type slot/port adapter/port]**.

Following is an example of how the **show interfaces** [*type slot/port adapter/port*] command displays status information (including the physical slot and port address) for the interfaces you specify. In these examples, most of the status information for each interface is omitted, and the four Token Ring interfaces (0–3) are in chassis slot 3, in port adapter slot 0. (Interfaces are administratively shut down until you enable them.)

```
Router# sh int tokenring 3/0/0
TokenRing3/0/0 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.2389)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)

Router# sh int tokenring 3/0/1
TokenRing3/0/1 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.238a)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)

Router# sh int tokenring 3/0/2
TokenRing3/0/2 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.238b)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)

Router# sh int tokenring 3/0/3
TokenRing3/0/3 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.238b)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
```

With the **show interfaces** *type slot/port adapter/port* command, use arguments such as the interface type (Token Ring, and so forth) and the slot, port adapter, and port numbers (slot/port adapter/port) to display information about a specific serial interface only.

The following example of the **show interfaces tokenring** *slot/port adapter/port* command shows all of the information specific to the first 4R interface port (interface port 0) in chassis slot 3, port adapter slot 0:

```
Router# sh int tokenring 3/0/0
TokenRing3/0/0 is administratively down, line protocol is down
  Hardware is cyBus TokenRing, address is 0000.0ca5.2300 (bia 0000.0ca5.2388)
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 4:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters 2:56:26
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 input packets with dribble condition detected
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets, 0 restarts
    0 output buffer failures, 0 output buffers swapped out
```

To determine which type of port adapter is installed on a VIP2 in your system, use the **show diag** *slot* command. Specific port adapter information is displayed, as shown in the following example of two 4R port adapters in chassis slot 8:

```
Router# show diag 8
Slot 8:
```

```

Physical slot 8, ~physical slot 0x7, logical slot 8, CBus 0
Microcode Status 0x4
Master Enable, LED, WCS Loaded
Board is analyzed
Pending I/O Status: None
EEPROM format version 1
VIP2 controller, HW rev 2.2, board revision UNKNOWN
Serial number: 03341418 Part number: 73-1684-02
Test history: 0x00 RMA number: 00-00-00
Flags: cisco 7000 board; 7500 compatible

EEPROM contents (hex):
 0x20: 01 15 02 02 00 32 FC 6A 49 06 94 02 00 00 00 00
 0x30: 07 2B 00 2A 1A 00 00 00 00 00 00 00 00 00 00 00

Slot database information:
Flags: 0x4 Insertion time: 0x3188 (01:20:53 ago)

Controller Memory Size: 8 MBytes

PA Bay 0 Information:
Token Ring PA, 4 ports
EEPROM format version 1
HW rev 1.1, Board revision 0
Serial number: 02827613 Part number: 73-1390-04

PA Bay 1 Information:
Token Ring PA, 4 ports
EEPROM format version 1
HW rev 1.1, Board revision 88
Serial number: 02023786 Part number: 73-1390-04

```

Using the ping Command

The **ping** command allows you to verify that an interface port is functioning properly and to check the path between a specific port and connected devices at various locations on the network. This section provides brief descriptions of the **ping** command. After you verify that the system and VIP2 have booted successfully and are operational, you can use this command to verify the status of interface ports.

The **ping** command sends an echo request out to a remote device at an IP address that you specify. After sending a series of signals, the command waits a specified time for the remote device to echo the signals. Each returned signal is displayed as an exclamation point (!) on the console terminal; each signal that is not returned before the specified time-out is displayed as a period (.). A series of exclamation points (!!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate that the connection failed.

Following is an example of a successful **ping** command to a remote server with the address 1.1.1.10:

```

Router# ping 1.1.1.10 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 1.1.1.10, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/15/64 ms
Router#

```

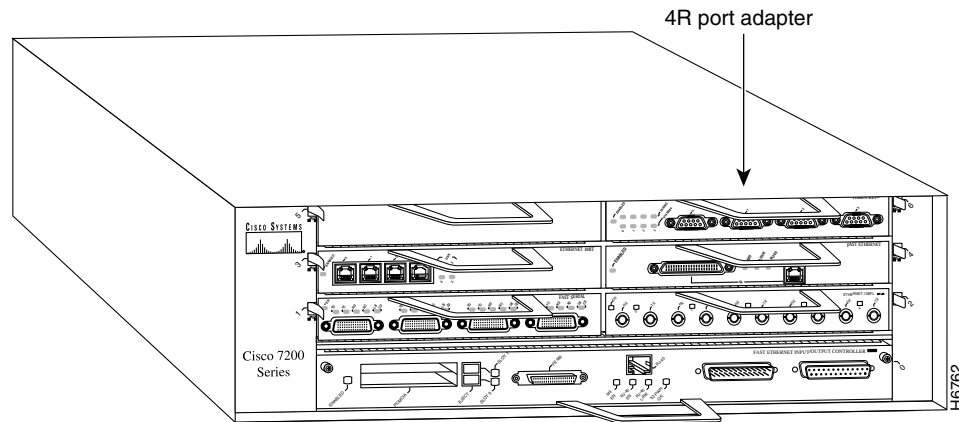
If the connection fails, verify that you have the correct IP address for the server and that the server is active (powered on), and repeat the **ping** command.

For complete descriptions of interface subcommands and the configuration options available for VIP2-related interfaces, and which support VIP2 functionality, refer to the publications listed in the section “If You Need More Information” on page 2.

Cisco 7200 Series and the 4R Port Adapter

The 4R port adapter can be installed in any of the available port adapter slots in Cisco 7200 series routers (which consists of the 2-slot Cisco 7202, 4-slot Cisco 7204, and the 6-slot Cisco 7206). shows a Cisco 7206 with a 4R port adapter installed in port adapter slot 6.

Figure 15 Cisco 7206 with a 4R Port Adapter in Port Adapter Slot 6



The following sections include information specific to the 4R port adapter and its use in the Cisco 7200 series routers:

- [Installing or Replacing a Port Adapter in Cisco 7200 Series Routers](#), page 27
- [Attaching 4R Port Adapter Interface Cables](#), page 30
- [Configuring the 4R Interfaces](#), page 31

Installing or Replacing a Port Adapter in Cisco 7200 Series Routers

This section provides the standard procedures for installing or replacing port adapters in a Cisco 7200 series router.

Depending on your circumstances, you might need to install a new port adapter in a Cisco 7200 series router or replace a failed port adapter in the field. In either case no tools are necessary; all port adapters available for the Cisco 7200 series connect directly to the router midplane and are locked into position by a port adapter lever. When removing and replacing a port adapter, you will need an antistatic mat onto which you can place a removed port adapter and an antistatic container into which you can place a failed port adapter for shipment back to the factory.



Note

The Cisco 7200 series routers support OIR; therefore, you do not have to power down the Cisco 7200 series routers when removing and replacing a port adapter.

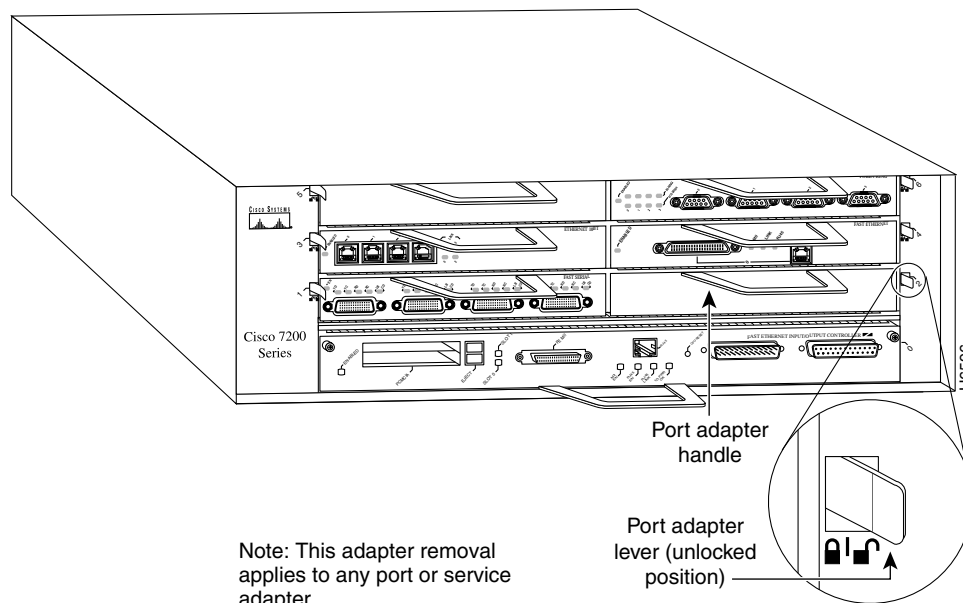
When a port adapter slot is not in use, a blank port adapter must fill the empty slot to allow the router to conform to EMI emissions requirements and to allow proper air flow across the port adapters. If you plan to install a new port adapter in a slot that is not in use, you must first remove a blank port adapter.

Removing a Port Adapter

Use the following standard procedure to remove a port adapter from a Cisco 7200 series router:

-
- Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.
- Step 2** Place the port adapter lever for the desired port adapter slot in the unlocked position. The port adapter lever remains in the unlocked position. (Refer to [Figure 16](#).)

Figure 16 *Placing the Port Adapter Lever in the Unlocked Position (Cisco 7206 Shown)*



- Step 3** Grasp the handle on the port adapter and pull the port adapter from the midplane, about halfway out of its slot. If you are removing a blank port adapter, pull the blank port adapter from the port adapter slot.

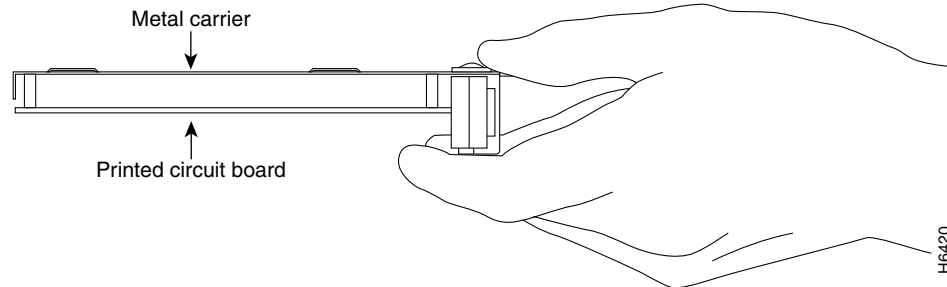


Note As you disengage the port adapter from the router midplane, OIR administratively shuts down all active interfaces on the port adapter.

- Step 4** With the port adapter halfway out of the slot, disconnect all cables from the port adapter.
- Step 5** After disconnecting the cables, pull the port adapter from its port adapter slot.



Caution Always handle the port adapter by the carrier edges and handle; never touch the port adapter's components or connector pins. (Refer to [Figure 17](#).)

Figure 17 Handling a Port Adapter

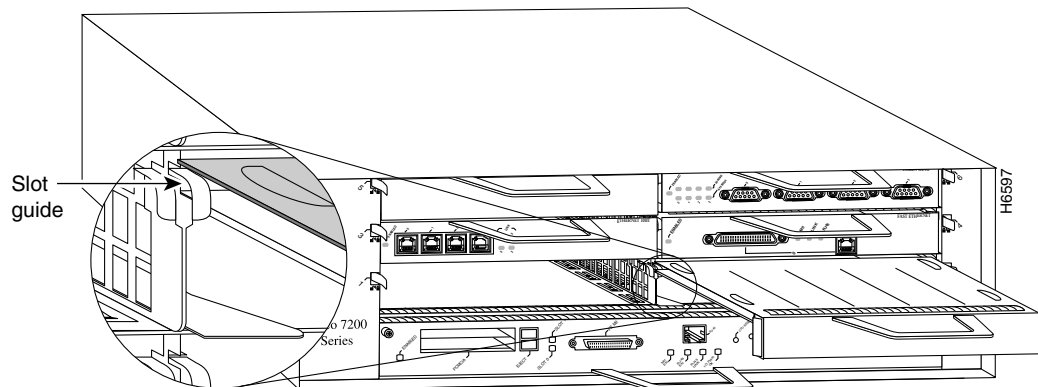
- Step 6** Place the port adapter on an antistatic surface with its components facing upward, or in a static shielding bag. If the port adapter will be returned to the factory, immediately place it in a static shielding bag.

This completes the procedure for removing a port adapter from a Cisco 7200 series router.

Replacing a Port Adapter

Use the following standard procedure to install a new port adapter in a Cisco 7200 series router:

- Step 1** Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.
- Step 2** Use both hands to grasp the port adapter by its metal carrier edges and position the port adapter so that its components are downward. (Refer to).
- Step 3** Align the left and right edge of the port adapter metal carrier between the guides in the port adapter slot. (Refer to [Figure 18](#).)

Figure 18 Aligning the Port Adapter Metal Carrier Between the Slot Guides (Cisco 7206 Shown)

Note: This adapter alignment applies to any port or service adapter.

- Step 4** With the metal carrier aligned in the slot guides, gently slide the port adapter halfway into the slot.



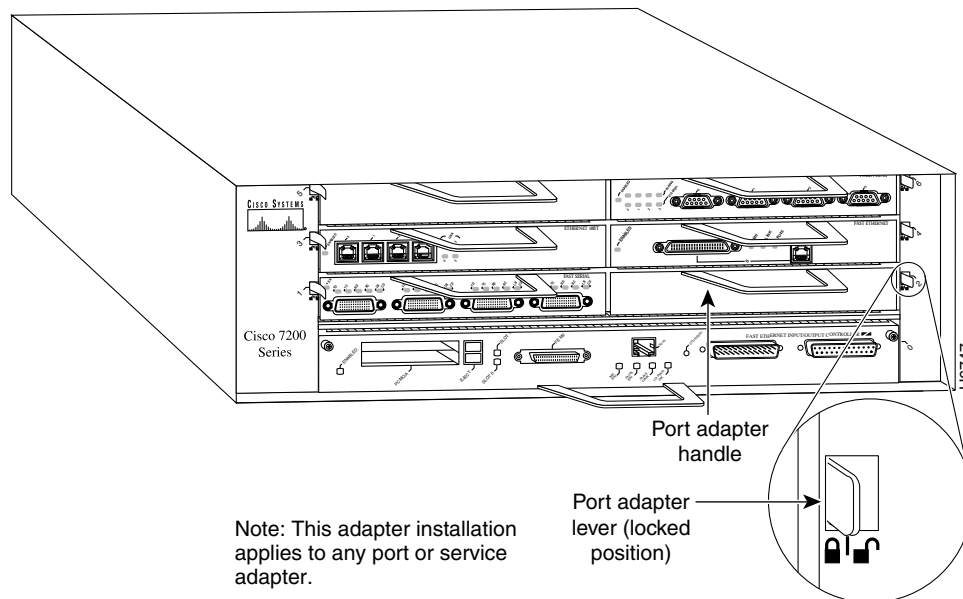
Caution Do not slide the port adapter all the way into the slot until you have connected all required cables. Trying to do so will disrupt normal operation of the router.

- Step 5** With the port adapter halfway in the slot, connect all required cables to the port adapter.
- Step 6** After connecting all required port adapter cables, carefully slide the port adapter all the way into the slot until you feel the port adapter's connectors seat in the midplane.
- Step 7** Move the port adapter lever to the locked position. shows the port adapter lever in the locked position.



Note If the port adapter lever does not move to the locked position, the port adapter is not completely seated in the midplane. Carefully pull the port adapter halfway out of the slot, reinsert it, and move the port adapter lever to the locked position.

Figure 19 Placing the Port Adapter Lever in the Locked Position (Cisco 7206 Shown)



This completes the procedure for installing a new port adapter in a Cisco 7200 series router.

Attaching 4R Port Adapter Interface Cables

The Token Ring ports on the 4R port adapter run at either 4 or 16 Mbps. You need one Token Ring interface cable for each 4R port adapter interface you want to use. Token Ring interface cables are not available from Cisco Systems, but are commercially available through outside cable vendors. Port adapters have a handle but this handle is not shown in to allow a full view of detail on the 4R port adapter's faceplate.

Use the following procedure to attach Token Ring cables to the 4R port adapter:

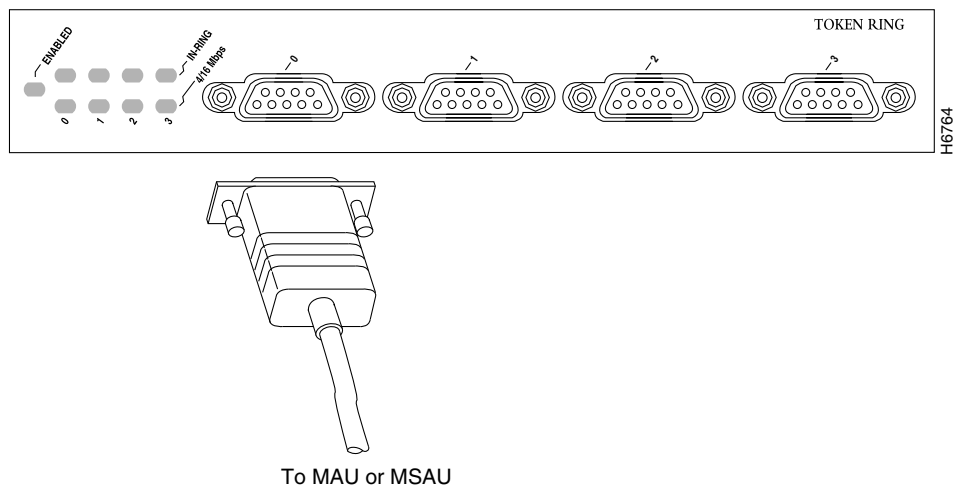
Step 1 Determine which 4R port adapter ports you want to use.



Note The IBM Token Ring specifies a star topology, with all end stations connected through a device called an MSAU. IEEE 802.5 does not specify any topology, although most implementations are based on a star configuration with end stations attached to a device called an MAU. Also, IBM Token Ring specifies twisted-pair cabling, whereas IEEE 802.5 does not specify media type. Most Token Ring networks use shielded twisted-pair (STP) cabling; however, some networks that operate at 4 Mbps use UTP cable.

Step 2 Attach the port adapter end of a Token Ring interface cable, or other connection equipment, to the interface port. (See [Figure 20](#)).

Figure 20 Token Ring Interface Cable Connections



Caution Each 4R port adapter interface must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the 4R port adapter interface is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

Step 3 Attach the network end of the Token Ring interface cable to the appropriate Token Ring equipment at your site: a MAU or MSAU.

This completes the procedure for attaching 4R port adapter interface cables.

Configuring the 4R Interfaces

The following procedures describe basic configuration information for the 4R port adapter. If you installed a new 4R port adapter or if you want to change the configuration of an existing interface, you must enter configuration mode using the **configure** command. If you replaced a 4R port adapter that was previously configured, the system will recognize the new 4R interfaces and bring them up in their existing configuration.

After you verify that the new 4R port adapter is installed correctly (the enabled LED goes on), use the privileged-level **configure** command to configure the new interfaces. Be prepared with the information you will need, such as the following:

- Protocols you plan to route on each new interface
- Internet protocol (IP) addresses if you plan to configure the interfaces for IP routing
- Whether the new interfaces will use bridging

**Note**

The 4R interfaces in a Cisco 7206 can be configured for 16-Mbps operation and are configured for 4-Mbps operation as a default.

For a summary of the configuration options available and instructions for configuring the 4R interfaces on the Cisco 7206, refer to the appropriate configuration publications listed in the section “If You Need More Information” on page 2.

Selecting Port Adapter Slot and Token Ring Interface Port Numbers

The following section describes how to identify port adapter slot and Token Ring interface port numbers. In the router, physical port addresses specify the actual physical location of each interface port on the router. (See .) This address is composed of a two-part number in the format *port adapter slot number/interface port number*, as follows:

- The first number identifies the chassis slot in which the 4R port adapter is installed.

The second number identifies interface ports on each 4R port adapter and are always numbered in sequence as interface 0 through 3.

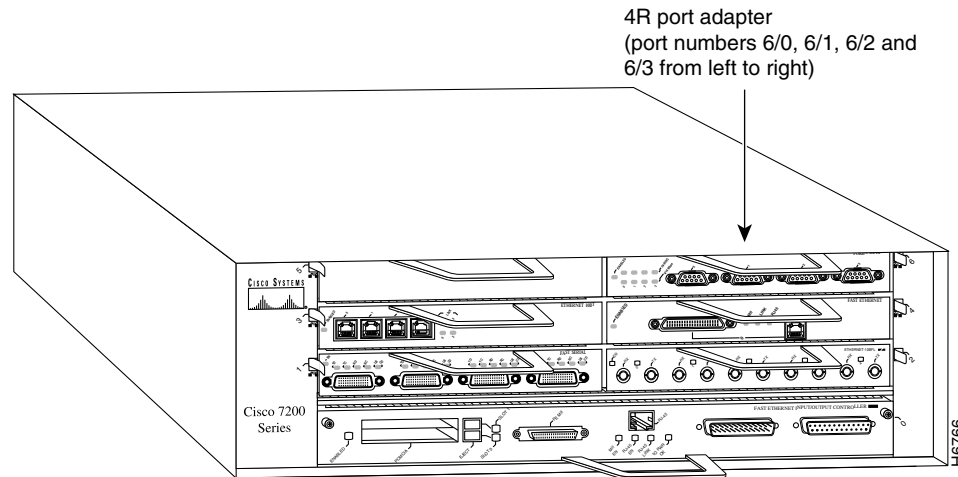
Interface ports on the 4R port adapter maintain the same address regardless of whether other port adapters are installed or removed. However, when you move a port adapter to a different slot, the first number in the address changes to reflect the new slot number.

In the Cisco 7200 series routers, port adapter slots are numbered from the lower left to the upper right, beginning with port adapter slot 1 and continuing through port adapter slot 2 for the Cisco 7202, slot 4 for the Cisco 7204, and slot 6 for the Cisco 7206. Port adapter slot 0 is reserved for the optional Fast Ethernet port on the I/O controller—if present. [Figure 21](#) shows the port adapter slots and interface ports of a Cisco 7206.

**Note**

The I/O controller is available with or without a Fast Ethernet port. You can install both I/O controller types in all Cisco 7200 series routers; however, when you install an I/O controller with a Fast Ethernet port in a Cisco 7202, the system software automatically disables the port.

The individual interface port numbers always begin with 0. The number of additional ports depends on the number of ports on a port adapter. For example, the addresses of the interface ports on the 4R port adapter in slot 6 are 6/0 through 6/3 (chassis slot 6 and interface ports 0 through 3). If the 4R port adapter were installed in port adapter slot 4, the interface addresses would be 4/0 through 4/3.

Figure 21 4R Token Ring Interface Port Number Example

You can also identify interface ports by physically checking the slot/interface port location on the back of the router or by using software commands to display information about a specific interface or all interfaces in the router.

Configuring Interfaces

Following are instructions for a basic interface configuration using the **configure** command: enabling an interface, setting interface ring speed, and specifying IP routing. You might also need to enter other configuration subcommands depending upon the requirements for your system configuration. Press the **Return** key after each step unless otherwise noted. At any time you can exit the privileged level and return to the user level by entering **disable** at the prompt as follows:

```
Router# disable
Router>
```

Use the following procedure to perform a basic configuration:

- Step 1** At the privileged-level prompt, enter configuration mode and specify that the console terminal will be the source of the configuration subcommands, as follows:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
```

- Step 2** Specify the first Token Ring interface to configure by entering the subcommand **interface type (token ring) and slot/interface** (port adapter slot number and interface number). The example that follows is for the first interface of the port adapter in slot 6:

```
Router(config)# interface tokenring 6/0
```

- Step 3** If IP routing is enabled on the system, you can assign an IP address and subnet mask to the interface with the **ip address** configuration subcommand as follows:

```
Router(config-if)# ip address 1.1.1.10 255.255.255.0
```

**Caution**

Each Token Ring port must be configured for the same ring speed as the ring to which it is connected; either 4 or 16 Mbps. If the port is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

**Note**

Token Ring ports operate at either 4 or 16 Mbps. The default speed for the 4R port adapter's Token Ring ports is 4 Mbps, which you can change to 16 Mbps on any port using the configuration **ring-speed** *n* command, where *n* is the speed (4 or 16) in Mbps. Before you enable the Token Ring interfaces, ensure that each is set for the correct speed, or it can bring down the ring.

- Step 4** Change the shutdown state to up and enable the interface as follows:

```
Router(config-if)# no shutdown
```

When you enable the interface by using the **no shutdown** command, the LED for 4 Mbps or 16 Mbps is turned on after about 5 seconds. The In Ring LED for that interface is turned on about 5 to 18 seconds later, when the port is initialized and connected to the ring.

- Step 5** Either accept the default ring speed of 4 Mbps, or enable the Token Ring interface speed for 16-Mbps operation as follows:

```
Router(config-if)# ring-speed 16
```

- Step 6** Enter any additional configuration subcommands required.

- Step 7** Repeat [Step 2](#) through [Step 6](#) for each new interface.

- Step 8** When all new interfaces are configured, press **Ctrl-Z** (hold the **Control** key down and press the **Z** key).

- Step 9** Write the new configuration to nonvolatile memory by entering the following:

```
Router# copy running-config startup-config
[OK]
Router#
```

To check the interface configuration using **show** commands, proceed to the section "[Checking the Configuration.](#)"

Checking the Configuration

After configuring the new interface, use the **show** commands to display the status of the new interface or all interfaces and use the **ping** command to check connectivity.

Using show Commands to Verify the New Interface Status

The following steps use **show** commands to verify that the new interfaces are configured and operating correctly.

- Step 1** Display the system software and hardware configuration with the **show version** command. Ensure that the list includes the new interfaces and that your system is running the appropriate Cisco IOS software for your configuration.

- Step 2** Display all the current interface processors and their interfaces with the **show controllers** command. Verify that the new 4R port adapter appears in the correct slot.
- Step 3** Specify one of the new interfaces with the **show interfaces port adapter type slot/interface** command and verify that the first line of the display specifies the interface with the correct slot number. Also verify that the interface and line protocol are in the correct state: up or down.
- Step 4** Display the protocols configured for the entire system and specific interfaces with the **show protocols** command. If necessary, return to configuration mode to add or remove protocol routing on the system or specific interfaces.
- Step 5** Display the running configuration file with the **show running-config** command. Display the configuration stored in NVRAM using the **show startup-config** command. Verify that the configuration is accurate for the system and each interface.

If the interface is down and you configured it as up, or if the displays indicate that the hardware is not functioning properly, ensure that the network interface is properly connected and terminated. If you still have problems bringing the interface up, contact a service representative for assistance.

Using show Commands to Display Interface Information

To display information about a specific interface, use the **show interfaces** command with the interface type and port address in the format **show interfaces [type slot/port]**.

Following is an example of how the **show interfaces [type slot/port]** command displays status information (including the physical slot and port address) for the interfaces you specify. In these examples, most of the status information for each interface is omitted, and the four Token Ring interfaces (0–3) are in port adapter slot 6. (Interfaces are administratively shut down until you enable them.)

```
Router# sh int tokenring 6/0
TokenRing6/0 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
(display text omitted)
```

```
Router# sh int tokenring 6/1
TokenRing6/1 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
(display text omitted)
```

```
Router# sh int tokenring 6/2
TokenRing6/2 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
(display text omitted)
```

```
Router# sh int tokenring 6/3
TokenRing6/3 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
(display text omitted)
```

With the **show interfaces** *type slot/port* command, use arguments such as the interface type (Token Ring, and so forth) slot, and the port number (slot/port) to display information about a specific Token Ring interface only.

The following example of the **show interfaces tokenring** *slot/port* command shows all of the information specific to the first 4R interface port (interface port 0) in port adapter slot 6:

```
Router# sh int tokenring 6/0
TokenRing6/0 is administratively down, line protocol is down
  Hardware is IBM2692, address is 0000.0000.0000 (bia 0000.0000.0000)
  MTU 4464 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
  ARP type: SNAP, ARP Timeout 04:00:00
  Ring speed: 16 Mbps
  Single ring node, Source Route Transparent Bridge capable
  Ethernet Transit OUI: 0x000000
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 transitions
```

To determine which type of port adapter is installed on a Cisco 7206 in your system, use the **show diag** *slot* command. Specific port adapter information is displayed, as shown in the following example of a 4R port adapter in port adapter slot 6:

```
Router# show diag 6

Slot 6:
Token-ring port adapter, 4 ports
Port adapter is analyzed
Port adapter insertion time 1d18h ago
Hardware revision 1.0          Board revision A0
Serial number 2023868         Part number 73-1390-04
Test history 0x0              RMA number 00-00-00
EEPROM format version 1
EEPROM contents (hex):
  0x20: 01 05 01 00 00 1E E1 BC 49 05 6E 04 00 00 00 00
  0x30: 50 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

For complete command descriptions and examples for the Cisco 7200 series routers, refer to the publications listed in the section “If You Need More Information” on page 2.

Using the ping Command

The **ping** command allows you to verify that an interface port is functioning properly and to check the path between a specific port and connected devices at various locations on the network. This section provides brief descriptions of the **ping** command. After you verify that the system has booted successfully and is operational, you can use this command to verify the status of interface ports. Refer to the publications listed in the section “If You Need More Information” on page 2, for detailed command descriptions and examples.

The **ping** command sends an echo request out to a remote device at an IP address that you specify. After sending a series of signals, the command waits a specified time for the remote device to echo the signals. Each returned signal is displayed as an exclamation point (!) on the console terminal; each signal that is not returned before the specified time-out is displayed as a period (.). A series of exclamation points (!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate that the connection failed.

Following is an example of a successful **ping** command to a remote server with the address 1.1.1.10:

```
Router# ping 1.1.1.10 <Return>
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 1.1.1.10, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/15/64 ms
Router#
```

If the connection fails, verify that you have the correct IP address for the server and that the server is active (powered on), and repeat the **ping** command.

For complete descriptions of interface subcommands and the configuration options available for Cisco 7206-related interfaces and functionality, refer to the publications listed in the section “If You Need More Information” on page 2.

Related Documentation

The documentation listed below is available online, on the Documentation CD-ROM, or as printed documents.

Your router, switch, or gateway and the Cisco IOS software running on it contain extensive features and functionality, which are documented in the following resources:

- Cisco IOS software:
 - For configuration information and support, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.
 - To check the minimum software requirements of Cisco IOS software with the hardware installed on your router, Cisco maintains the Software Advisor tool on Cisco.com: <http://www.cisco.com/cgi-bin/Support/CompNav/Index.pl>. You must be a registered user on Cisco.com to access this tool.



Note You can access Cisco IOS software configuration and hardware installation and maintenance documentation on the World Wide Web at http://www.cisco.com/public/countries_languages.shtml.

- Cisco 7200 series routers:
 - For port adapter hardware and memory configuration guidelines, refer to the *Cisco 7200 Series Port Adapter Hardware Configuration Guidelines*.
 - For hardware installation and maintenance information (including the Cisco 7206 or Cisco 7206VXR as a router shelf in a Cisco AS5800 Universal Access Server), refer to the installation and configuration guide that shipped with your Cisco 7200 series router.
 - For information on network processing engines or network services engines, refer to the *Network Processing Engine and Network Services Engine Installation and Configuration* publication.
 - For information on the router boot images, refer to the *Cisco 7200 Series Routers Boot Images Information* publication.
- Cisco 7500 series routers:

For hardware installation and maintenance information, refer to the following publications:

 - *Cisco 7500 Installation and Configuration* or the quick start guide that shipped with your router
 - *Second-Generation Versatile Interface Processor (VIP2) Installation and Configuration*
- For international agency compliance, safety, and statutory information for WAN interfaces:
 - *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers*
 - *Regulatory Compliance and Safety Information for the Cisco 7500 Series Routers*
 - *Site Preparation and Safety Guide*
- To view Cisco documentation or obtain general information about the documentation, refer to the following sections:
 - [Obtaining Documentation, page 39](#)
 - [Obtaining Technical Assistance, page 40](#)

- Customer service at 800 553-6387 or 408 526-7208. Customer service hours are 5:00 a.m. to 6:00 p.m. Pacific time, Monday through Friday (excluding Cisco-observed holidays). You can also send e-mail to cs-rep@cisco.com.

Obtaining Documentation

These sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

<http://www.cisco.com>

Translated documentation is available at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

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http://www.cisco.com/cgi-bin/order/order_root.pl
- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:
<http://www.cisco.com/go/subscription>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

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Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Cisco TAC inquiries are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.

- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to this URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

<http://www.cisco.com/register/>

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC Web Site, you can open a case online by using the TAC Case Open tool at this URL:

<http://www.cisco.com/tac/caseopen>

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

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